

# **Bellwork: 1/9/13**

**Solve using the quadratic formula:**

$$3x^2 = 2(2x+1)$$

$$3x^2 = 4x + 2$$

$$3x^2 - 4x - 2 = 0$$

$$a=3 \quad b=-4 \quad c=-2$$

$$\frac{4 + \sqrt{40}}{6}$$

$$1.7$$

$$\frac{4 \pm \sqrt{(-4)^2 - 4(3)(-2)}}{2(3)}$$

$$\frac{4 \pm \sqrt{40}}{6}$$

$$\frac{4 - \sqrt{40}}{6}$$

$$-4$$

$$\frac{4 \pm 2\sqrt{10}}{6}$$

$$\frac{2 \pm \sqrt{10}}{3}$$

## Algebra 2B - Imaginary & Complex Numbers

**Simplify.**

1.)  $\sqrt{16 - 4(2)(1)}$

$$\sqrt{8}$$

2 real answers

2.)  $\sqrt{64 - 4(1)(16)}$

$$\sqrt{0}$$

1 real answer

3.)  $\sqrt{25 - 4(1)(8)}$

$$\sqrt{-7}$$

0 real answers

### Imaginary Numbers

If  $r > 0$ , then the imaginary number  $\sqrt{-r}$  is defined as follows:

$$\sqrt{-1} = i$$

$$\sqrt{-1} = 1i$$

$$\sqrt{-r} = \sqrt{-1} \cdot \sqrt{r} = i\sqrt{r}$$

$$\sqrt{-3} = \sqrt{-1} \cdot \sqrt{3} = i\sqrt{3}$$

Example 1:

a.)  $\sqrt{-4}$

$$i\sqrt{4}$$

$$2i$$

b.)  $\sqrt{-6}$

$$i\sqrt{6}$$

$$i\sqrt{6}$$

c.)  $\sqrt{-28}$

$$i\sqrt{28}$$

$$i\sqrt{4 \cdot 7}$$

$$2i\sqrt{7}$$

Example 2:

a.) Complete the table below.

$i$	$i^2 =$	$i^3 =$	$i^4 =$
$i^5 =$	$i^6 =$	$i^7 =$	$i^8 =$

### Complex Numbers

$$3 + 5i$$

$$-4 + 7i$$

$$-2 - 6i$$

$$a + bi$$

(standard form)

where a is called the real part

and b is called the imaginary part

$$\sqrt{-16}$$

$$4i$$

$$\sqrt{-5}$$

$$i\sqrt{5}$$

$$\sqrt{-25}$$

$$5i$$

$$\sqrt{-12}$$

$$2i\sqrt{3}$$

$$\begin{array}{r} 12 \\ \sqrt{\phantom{00}} \\ 4\phantom{0} \\ \hline 28 \end{array}$$

$$\sqrt{-48}$$

$$4i\sqrt{3}$$

$$\begin{array}{r} 48 \\ \sqrt{\phantom{00}} \\ 16\phantom{0} \\ \hline 49 \end{array}$$

$$\sqrt{-50}$$

$$5i\sqrt{2}$$

$$\begin{array}{r} 50 \\ \sqrt{\phantom{00}} \\ 25\phantom{0} \\ \hline 55 \end{array}$$

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#### Algebra 2B - Imaginary & Complex Numbers

**Example 1:** Find each sum and difference.

a.)  $(-3 + 5i) + (7 - 6i)$

b.)  $(-3 - 8i) - (-2 - 9i)$

**YOU TRY:** Find each sum and difference.

1.)  $(-9 + 2i) - (3 - 4i)$

2.)  $(-10 - 6i) + (8 - i)$

**Example 2:** Multiply  $(2 + i)(-5 - 3i)$

**YOU TRY:** Multiply  $(6 - 4i)(5 - 4i)$

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Algebra 2B - Imaginary & Complex Numbers

☺ In order to simplify a fraction containing complex numbers, you need to use the *conjugate of a complex number*.

**Conjugate of a Complex Number**

**\*\*The conjugate of a complex number  $a + bi$  is  $a - bi$**

**Example 3:** Simplify  $\frac{2+5i}{2-3i}$ . Write your answers in standard form.

**YOU TRY:** Simplify  $\frac{3-4i}{2+i}$ . Write your answers in standard form.

**YOU TRY:** Simplify  $\frac{3-2i}{-4+i}$ . Write your answers in standard form.

**Homework: pg 253 #8-12 all and 18-30 even**

